

WHITE (J. W.) With the Compliments of
J. William White,
1910 S. Rittenhouse Sq., Phila.

AN ADDRESS
ON
APPENDICITIS.

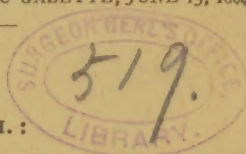
*Delivered before the Surgical Section of the College of
Physicians of Philadelphia.*

BY
J. WILLIAM WHITE,
Professor of Clinical Surgery, University of Pennsylvania.

REPRINTED FROM THE THERAPEUTIC GAZETTE, JUNE 15, 1894.

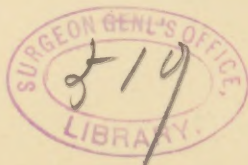
DETROIT, MICH. :
GEORGE S. DAVIS, PUBLISHER.

1894.



AN ADDRESS ON APPENDICITIS.

IT has been my intention in preparing this paper merely to review some of those important points relating to the cause, course, and diagnosis of appendicitis, and more especially to its treatment, about which great differences of opinion still exist in the profession, and to make my own slight contribution towards the acquirement of a fulness and certainty of knowledge which will permit us at some future day to lay down certain broad general propositions accepted and endorsed by both surgeons and physicians. The divergence in the views at present advanced is extraordinary. If the disease were a rare one, met with by but a few consultants and requiring special technical skill for its investigation, the reason for this want of agreement would seem evident. That we do not know to-day whether purpura hemorrhagica is a disease of the blood or blood-vessels or of the nervous system is not strange. Few of us have seen fatal cases, still fewer have had an opportunity to make autopsies or blood examinations in such cases. But there is scarcely a practitioner of five years' standing in any part of the world who has not seen and treated inflammation of the vermiform appendix, and the sum total of pro-



fessional experience is already so enormous that one would think it amply sufficient to resolve all doubts and to place the guiding principles of diagnosis and treatment upon a firm scientific basis.

On the contrary, it is scarcely an exaggeration to say that attentive perusal of the voluminous literature of the last ten years, beginning with the papers of Treves and of Fitz and ending with those now in process of publication, will demonstrate that there has been made scarcely one single statement as to the essential etiology, the pathognomonic symptoms, or the appropriate treatment which has not been flatly, often violently, contradicted.

This condition of affairs reflects but little credit on the profession, and certainly renders it proper that at short intervals we should pause, review and weigh the existing evidence, and strive for the common ground of agreement which is sure to be reached sooner or later.

I shall consider only the broader questions involved, selecting those about which there are unavoidable uncertainty and anxiety and equally unavoidable differences of opinion at the bedside. I shall illustrate clinically only from my own experience.

The valuable papers of Fowler, Richardson, and Treves are still so recent and so exhaustive that my chief function must be to present for your criticism the conclusions at which I have myself arrived, and my reasons therefor.

As regards etiology, we may first consider (*a*) the *predisposing* causes. The explanation of the great frequency with which the appendix becomes the seat of inflammatory

and destructive lesions as compared with the other portions of the digestive tract is undoubtedly to be found in its embryology and in its anatomical relations. There can be no question that those structures which remain to us as functionless vestiges of parts once useful in our prehistoric ancestors are possessed of low vitality and but feeble resistant powers. This is as true in the life of the race as in that of the individual. It doubtless explains in part the special susceptibility of the appendix to inflammation, as it does that of the uterus and the female breast to cancer during the post-sexual period of life.

In addition, its dependent position, its communication by an orifice, often more or less narrowed, with that portion of the intestine in which inspissation of intestinal contents first occurs, while at the same time it is removed from the direct fæcal current, all appear to be conditions so markedly predisposing to inflammatory attacks that we need look no further for a sufficient explanation of the extraordinary frequency of appendix trouble.

(b) *Exciting Causes*.—Putting aside the comparatively rare cases in which tubercular or other general disease localizes itself in the appendix, we have two chief classes of exciting agencies, clinical differentiation of which is to be earnestly aimed at: the *mechanical* and the *bacterial* or *infective*. The latter comes into play usually, perhaps almost constantly, as a sequel of the former, which may, I believe, exert its action alone from first to last in a given instance, and does so in many cases.

The following anatomical points must be remembered. The appendix is commonly found

curved upon itself, because its mesentery, derived from the inferior layer of the mesentery of the ileum, is too short for it. In the foetal type of the cæcum and appendix the latter has a mesentery which runs to its tip, but in the majority of adults it ends about the centre of the appendix or at the junction of its middle and distal thirds. Along the free concave border of the mesentery runs a single vessel, a branch of the ileo-colic, and from this branch the appendix, as a rule, derives almost its entire blood-supply. Another peritoneal fold runs from that part of the ileum most remote from its mesenteric attachment and is united with the mesentery of the appendix. It carries no blood-vessels. It is the remains of the *true* mesentery of the appendix (Treves). It is interesting to note the fact that in the different types of cæcum found in our species, those which involve a disproportionate growth of the cæcum show that it derives its peritoneal covering partly at the expense of the mesentery of the appendix, which becomes more and more scanty and more vertical in direction the larger the relative size of the cæcum.

We here have the factors which enter into the production of a large number of cases of appendicitis. Distention of the ileum with gas, or of the caput coli with gas or faecal matter, will cause dragging on one or the other of these folds, already too scanty, increase the torsion of the appendix, interfere with the blood-supply through its single vessel, and, according to the degree of torsion, produce congestion and tumefaction, catarrhal inflammation, ulceration or gangrene, with the clinical symptoms that belong to each. The ana-

tomical conditions are so simple and easily understood, and explain so completely various well-known types of the disease, that it seems to me we may assume them to be sufficient in many cases to account for all the symptoms.

The importance of the matter will be apparent if we remember that it has been asserted that all cases of appendicitis are infectious in their nature, and that from this assumption has followed the corollary that all cases should be operated on, as one attack would mean almost certainly another at some future time.

It seems probable, though hardly yet proved, that the *bacterial* cause of appendicitis is, as a rule, the bacterium coli commune, perhaps the most interesting micro-organism that is being studied at the present day. It is almost invariably to be found in the intestinal tract, and seems in the presence of sound mucous membrane to have little or no power for evil; but it is equally well demonstrated that if the epithelium is once destroyed it has both pathological and pyogenic properties.

Experiments have shown that even a moderate degree of constriction of the intestinal canal may be followed by the penetration of its wall by this bacterium, and also that its virulence is much increased by the presence of irritative conditions such as exist in advanced constipation or marked diarrhoea, even when produced experimentally by opium or by tartar emetic.

Other micro-organisms are exceptionally associated with acute appendicitis, but the most reliable observations seem to show that in eighty-two per cent. of infective cases this bacterium is the active agent (Tavel and Lanz).

A third class of causes which may be regarded as both predisposing and exciting must be made to include fæcal concretions and foreign bodies. The latter, once thought to be the chief factors in producing the disease, are now known to be of great rarity, occurring in only about four per cent. of operative cases (Matterstock, Fowler). Fæcal concretions are found in fifteen to twenty per cent. of such cases, and there is evidence to show that they may occasionally, by their presence, give rise to the lesion of the mucous coat which precedes infective processes; but they are so often absent in cases of all grades of severity, and so often present in autopsies on persons who have died from other diseases, that they should not be considered of primary importance.

The effect of age must be taken into account in summing up the etiological factors. It is certain that the two extremes of life are notably exempt, but the explanation of this fact is thus far purely theoretical.

It is asserted that in very early life the funnel-shaped appendix, apex downward, offers fewer opportunities for the formation and retention of masses of inspissated fæces, while in old age atrophy of the mucous membrane about the cæcal orifice of the tube again widens it; but we lack positive knowledge upon these points. The very existence of the fold of mucous membrane known as the valve of Gerlach is disputed, and in any event it is so imperfect mechanically as to be presumably of slight importance.

The disproportion between the sexes requires explanation. If we accept the usual description of the anatomy of the parts concerned,

there seems to be no good reason why appendicitis should be found in males four or five times more frequently than in females; but if future observation confirm the assertion of Clado, that a fold of peritoneum passes from the right ovary to the meso-appendix—the appendiculo-ovarian ligament,—and if this fold carries a blood-vessel, an obvious, and it seems to me a sufficient, explanation has been found. It has been shown (Bryant) that the male appendix is four-tenths of an inch longer than that of the female; that its calibre is slightly larger; and, possibly as a result of the latter fact, that it contains faecal concretions in a larger percentage of cases. But these circumstances do not seem to throw much light on the subject.

The manner in which constipation, or diarrhoea and digestive disturbances generally, favor the development of appendicitis is now evident. We have a vestigial structure of relatively poor vitality and low resistant power, so situated mechanically that its one source of blood-supply is greatly interfered with by twisting or dragging, and connected by short and scanty folds of serous membrane with portions of the digestive tract especially liable to changes of form and size which thus easily produce such torsion or tension. Furthermore, a micro-organism capable of great virulence if epithelial exfoliation occurs or if any area of lessened resistance exists is almost constantly present.

Clinical Classification.—Thus far, while there are minor differences of opinion, we are in the main on safe ground; but when we come to take the next step the lack of definite knowledge becomes painfully apparent, and we must, as it were, feel our way with caution.

How are we to recognize clinically the cases in which the mechanical element alone is the factor and the circulatory disturbance stops short of the production of necrotic lesions of epithelium, mucous membrane, or appendix wall?

If the views advanced as to etiology are sound, not only do such cases occur, but they probably outnumber the more serious forms of the disease, frequent as are the latter. Statistics support this view, as there is good reason to believe that from sixty per cent. to eighty per cent. of cases of appendicitis recover without operation, and in the majority of these an infectious element must almost certainly be absent. Nor do the facts bear out the assertion so often made recently, that such recoveries are merely apparent or temporary. Every medical man who has had a large practice for the past decade—*i.e.*, since the knowledge of this disease has become so wide-spread (thanks to the labors of Treves, Fitz, Bull, McBurney, Weir, and others)—could disprove this statement from his own experience, unless a period of freedom of from five to ten years is not sufficient to establish permanency of cure. The all-important question to be settled at the present day is how to recognize such cases at the bedside.

If we review the early symptoms of a typical case of so-called mild or catarrhal appendicitis, and assign each to its anatomical or pathological cause, it is discouraging to find that thus far we have at this stage practically no means of distinguishing the cases which are going to stop short of grave organic lesion from those which, unless cut short by surgery, are predes-

tined to almost certain fatality ; and yet the review of such symptoms cannot be regarded as valueless, as only in this way, as time goes on, can we hope to reach diagnostic accuracy.

Let us suppose that we have a case in which constipation (which has been obviously or unsuspectedly present in ninety per cent. of my cases) or diarrhœa, or at least some digestive derangement, has caused intestinal distention with faecal matter or with gas, or irregular and excessive peristalsis in the ileo-cæcal region. The meso-appendix is dragged upon, the torsion of the appendix increased, the return of blood interfered with ; the arterial supply, more difficult to disturb than the venous current, is but little affected. If we could see such an appendix we would undoubtedly find swelling and congestion, hypersecretion, nerve irritation. It seems to me theoretically unreasonable to suppose that in every such case there is necrosis even of epithelium or infection even of low grade. It is probable, however, that there is, even in the mildest cases, an exudate under pressure into the submucous and muscular coats of the appendix wall and a slight adhesive peritonitis of very moderate extent. The post-mortem findings, which show that in one person out of every three there has been some pathological condition present in the appendix, are so out of proportion to the clinical percentage of frequency, large as that is, that it seems evident that some such minor attacks *must* take place, and often with phenomena so slight that they scarcely attract attention.

The usual symptoms of such a case as we are considering, with their explanation, are : *pain*, at first general and diffused over the abdomen,

because the superior mesenteric plexus of the sympathetic, which supplies the appendix, also largely supplies the intestines, and because irritative nerve pain is apt to be referred to the peripheral extremities of nerves; next and within a very short time felt in the umbilical region, because as such pain increases in intensity it is often referred to the nearest nerve centre, and the great sympathetic ganglia of the abdomen are situated in that region.

The pain at this time is often colicky in nature, and a discussion has arisen as to whether or not the circular muscular fibres in the appendix are of sufficient strength to cause it. The question will probably be settled in the affirmative, as the appendix has actually been observed in alternate spasm and relaxation when exposed in a wound (Morris); but it seems to me unimportant, as appendix irritation may result in colicky spasm of neighboring portions of either small or large intestine.

After a few hours the pain is felt in the right iliac fossa, because it has then become a neuritis of sufficient grade to cause *tenderness on pressure*. It is a *localized* tenderness in all the varieties of appendicitis, because while the appendix itself is movable, it always arises from the same part of the cæcum, and the mobility of the latter is much more restricted. The point of pain on pressure known as McBurney's point indicates, therefore, with moderate accuracy the base, not the tip, of the appendix, and is rarely absent even in gangrenous cases, because that portion of the appendix is usually the last to be affected by interference with the blood-supply.

Vomiting commonly follows, has little relation to gastric conditions, and is ordinarily reflex and due to reversed peristalsis, as the ejecta show a degree of digestive change corresponding to the time which has elapsed since the last meal.

Moderate fever (99.5° to 101° F.) and slightly *increased pulse-rate* (90 to 110) are usually present, and are doubtless due to the same sort of absorption of intestinal products as gives rise to the same symptoms in constipation or in true bilious colic, for which cases of this kind are sometimes mistaken.

There is slight *rigidity of the right rectus muscle*, and later of the other abdominal muscles over the right iliac fossa, often, but perhaps not necessarily, due to peritonitis, and in any event arising from the fact that those muscles receive their nerve-supply from the seven lower intercostals, while the superior mesenteric plexus gets its contribution from the spinal system through the splanchnics, derived from the same seven intercostals.

This group of symptoms includes all that are of any value in this type of appendix trouble. It has been asserted (Rushmore, Osler, and others) that to speak of the first day that the patient complains of pain as the first day of the disease is fallacious, and it is said that what we recognize in appendicitis is peritonitis, which has been preceded by ulceration of the mucous membrane and a perforation of the appendix itself, and that therefore the first day of pain is rather the last day than the first day of the disease.

Now, if this were demonstrably true it would, I think, oblige us to accept the rule laid down

by some surgeons, that the diagnosis of appendicitis brings with it the obligation to operate. But it is demonstrably untrue. Not only *does not* every case with the above symptoms have precedent ulceration, but there have now been enough early operations and removal of appendices at this stage to enable us to say positively that, apart from the conditions already described,—swelling, congestion, and associated vascular changes, and nerve irritation,—there are often no grave lesions of either the mucosa, the parietes of the appendix, or of its peritoneal covering.

I have dwelt upon the symptoms belonging to this class of cases because it is just here that the field of the physician and that of the surgeon is, or should be, essentially a common one. The patient naturally and properly sends for his usual medical adviser. It would, I think, be well if the latter asked for surgical help earlier and oftener than he now does. The problem with which he is confronted is as yet unsolved. While the explanation already given of the etiology and symptoms in these cases shows (1st) that they may depend upon mechanical causes, and are not necessarily infectious, and (2d) that there is no phenomenon associated with them which of itself indicates either a solution of continuity of the mucosa, infection of the appendix wall, or peritonitis, unfortunately, it must also be said that there is none which *excludes* the graver conditions. Fitz remarked eight years ago that while a simple catarrhal appendicitis exists anatomically, it is doubtful whether its clinical appreciation is possible. If he meant that its clinical differentiation from more serious conditions

could not accurately be made, his remark is still true. Colicky pain, localized tenderness, slight abdominal rigidity, vomiting, moderate fever, may be the only symptoms of a case which is going on to a rapid termination by gangrene, perforation, and septic peritonitis. It must, therefore, be decided whether, taking a large number of such cases, medical treatment or operation offers the best chance for recovery; and in reaching this decision it is impossible to ignore the oft-repeated assertion already alluded to, that all cases are essentially infectious, and that recovery from any particular attack is, as a rule, only apparent and temporary, not real or permanent.

This exceedingly important matter will sooner or later be settled statistically. At present the facts seem to be as follows: perhaps eighty per cent. of cases of this type recover under medical treatment. I have looked into the published figures as to this question with great care, and have gone back in my own case-books to the days when I saw a not inconsiderable number of medical cases annually. I believe that, on the whole, they may be taken as approximately correct. We are, however, in special need of reliable *medical* statistics as to this point. Of the remaining twenty per cent., at least one-half can be saved by operation during the condition of localized abscess, which would form in probably that proportion of cases. This assertion is based upon my own experience and upon the more extensive figures of Richardson, Fowler, and others. Of the remaining ten, in which no protective adhesions would form, a certain indeterminate proportion would recover after operation done

before septic peritonitis and intestinal paresis had occurred. This would leave a death-rate of, say, five to eight per cent.

If, on the other hand, every case were operated on as soon as seen, would this death-rate be increased or diminished? Here a similar need for surgical statistics exists, but is now being rapidly met. During the period when any particular operation is fighting for recognition, and is often performed in the face of much professional opposition, the history of surgery shows that, not unnaturally, the fatal cases do not find their way into print. This period, so far as appendicitis is concerned, has now about ended, but only very recently. No careful operator to-day hesitates to give his figures and results when he feels that they have become numerous enough to be of value, but they are not yet available in sufficiently large numbers in this particular class of cases. There is probably no one present who is not familiar with some unpublished cases of post-operative deaths, and although it is doubtless true that we all know of many more cases in which death has occurred for lack of operation, that fact does not affect the truth of my statement that we do not know the mortality of such an operation under those circumstances. It has been a favorite form of expression to speak of the death-rate as "practically *nil*," and to compare it with that of coeliotomy for exploratory purposes, as in cases of tumors, etc.; but the argument by comparison is fallacious. Certain facts resting on abundant evidence, both clinical and experimental, have been ignored. We would often operate in the presence of a peritoneal infec-

tion the exact limits of which would be indeterminate. This must include not only the actual presence of micro-organisms, but the presence of their secondary products, which are now believed occasionally to give rise to so-called "chemical peritonitis." Operation, however skilfully conducted, means of necessity a certain amount of traumatism to the peritoneum and an equivalent diminution of its local resistant power. Most surgeons of experience will agree with Treves, who in his recent admirable Lettsomian Lectures says, "There is no doubt that the nervous disturbance which attends any abdominal operation leads to some degree of intestinal paralysis. This paralysis, attended as it is by vaso-motor changes in the bowel-wall, is favorable to the absorption of septic matters from the intestine." It may be slight and may disappear spontaneously; but if it persists, it appears to permit of filtration through the intestinal wall of bacteria or their products. These latter are readily taken up by the peritoneum, and a septicæmia begins. It should also be remembered that Terillon has shown that the effect of irritation of the parietal peritoneum, which is chiefly disturbed in ordinary exploratory operations, is comparatively feeble, while it is violent and intense when that covering the intestines is involved (Treves).

Therefore, while both my experience and my observation lead me to believe that, in good hands, these very early operations will have an extremely low mortality, perhaps lower than that of the disease treated medically, I do *not* believe that it will be "practically *nil*;" and, at any rate, I do not think it fair to our

medical colleagues that we should take that position before we are able to demonstrate it.

As to the diagnosis of the class of cases we have just been considering, it is to be made chiefly from stercoral typhlitis, a condition which has been so overshadowed during the advance of our knowledge in regard to appendix disease that we are in danger of acting as if it were non-existent. In some elaborate reviews of the diagnosis of appendicitis it is hardly mentioned, and yet a very moderate clinical experience ought to convince any careful observer that it is not infrequent. It has many features in common with appendicitis, and it is quite possible, as has been asserted, that to some degree this is present in most cases of stercoral typhlitis, but the independent existence of the latter condition has been shown unquestionably both at autopsies and at operations, where severe forms of typhlitis and perityphlitis have been found to be dependent on stercoral ulcers of the cæcum, and the appendices were normal. It is unquestionably true that in the vast majority of cases of severe inflammation and suppuration in the right iliac fossa the appendix is at fault, but it should not be forgotten that in many of them the original trouble is a constipation, associated with distention of the cæcum by fecal masses often containing undigested food, and exciting both mechanical and chemical irritation. The relation of the mild attacks of appendicitis to digestive derangement has been quite unmistakable, in my experience, and it is not very uncommon to find in relapsing appendicitis that one particular article of food is the espe-

cial exciting cause of an attack. (See Case XII., page 399.)

Now, if in so many cases faecal distention of the cæcum is the starting-point of appendicitis, it is reasonable to believe that in some of them the trouble does not pass beyond the cæcum, and it is important to recognize these cases, because the prognosis is so much more favorable and operative measures need not, as a rule, be thought of.

They have occurred with me chiefly at the times of life when appendicitis is less common, and more especially in children. They can be recognized with certainty only by the initial presence of a doughy sausage-shaped tumor in the cæcal region associated with the usual symptoms of appendicitis in a modified form. The localized tenderness is not so great; the fever is very moderate; vomiting is rarely a prominent symptom; constipation is almost invariable, though occasionally a spurious diarrhœa (analogous to the "incontinence of retention" in bladder cases) may make its appearance.

The discovery of a tumor at the very beginning of an attack of apparent appendicitis of obviously mild type, would, I think, justify the diagnosis of stercoral typhlitis, but I know no other way in which the diagnosis can be made, and in the absence of that symptom it would be safer to consider doubtful conditions as almost certainly indicating appendicitis.

CASE I.*—A little girl, whom I saw in consultation with Drs. Lewis D. Harlow and Louis

* Wherever possible I have italicized the special point or points which these cases are intended to illustrate.

Starr, had an attack of vomiting followed by umbilical pain and almost immediately by right iliac tenderness. When I first saw her, about *eight hours after the beginning of the illness, a distinct mass could be felt in the cæcal region*; tenderness at the edge of the right rectus in the omphalo-spinous line was marked; she lay on her back with the knees drawn up; her temperature was 101° F., her pulse 110. Her mother stated positively that the bowels had moved regularly and that she had never known her to be constipated. Salines, which had already been given, were continued. Hot fomentations were applied to the abdomen. The diet was reduced to teaspoonful doses of peptonized milk at hourly intervals.

At the end of twenty-four hours there was a little aggravation of all the symptoms; at the end of forty-eight hours there was slight tympany; at the end of sixty hours, when we were considering the advisability of operation, there was an enormous stool, followed by two others in rapid succession and by a complete disappearance of all the symptoms.

It will be convenient now to consider the non-operative treatment of these mild "catarrhal" cases before passing on to those of the next grade.

Certain indications are so clear that there is practically no difference of opinion about them.

Ordinary clinical experience with other forms of enteritis demonstrates the value of *absolute rest* in bed and on the back. The frequent inability of the stomach to retain food, the certain inability of a portion of the intestinal tract

to take care of the residue, even if it reaches that point, and the absolute need for the avoidance of all sources of local irritation point so clearly to a diet reduced to the lowest possible terms that it is always a matter of surprise and disappointment to me to find patients, even in the early and acute stages of this disorder, being fed regularly every two, three, or four hours with portions of milk and lime-water, or often with more harmful foods, as though they were in the last stage of some exhausting disease. No one, beginning in comparative health, ever starved to death in three or four days. There is no doubt that many of these patients have been fed to death. *Starvation* in its therapeutic sense is one of the most important elements of treatment, and the nearer the patient comes to taking nothing except an occasional sip of water the safer he is.

The *local* use of *heat*, drawing the blood to the superficial veins of the abdomen, of *cold*, by means of ice kept on long enough to bring about local anæmia extending to the parietal peritoneum or deeper, or the actual abstraction of blood by *leeches*, seem to have about equal claims to employment. Personally, I prefer either the heat or the bloodletting. I strongly object to blisters, iodine, and the use of sneary ointments as rendering the skin more or less unsuitable for a satisfactory operation later, if one be required.

The question about which there is the widest apparent divergence of opinion concerns the respective merits of the use of salines and the use of opium. The very briefest review of current literature will show that the writers on this subject have practically ranged themselves in

two camps ; often, however, expressing most decided opinions without specifying at all the class or classes of cases to which they refer. Avoiding the extremists and taking the calmest and most carefully considered articles as examples, we find Osler saying, "If there is much pain, opium should be given hypodermically or by the mouth. . . . I would protest most earnestly against the indiscriminate use of saline purges." Pepper says that "so far as medical treatment goes, the great stand-by is opium in full doses ;" and adds, "that the same reasons that indicate opium should lead to the avoidance of salines." On the other hand, Treves says, "Give as little opium as possible ;" and adds that he is quite convinced of the value of aperients in the early stages of appendix troubles and sometimes throughout the attack ; while Fowler, after seeing one hundred and sixty cases, says that beyond the careful use of salines in the earliest stages of the mild cases the less medical treatment the better ; but adds, "above all things the use of opium must be avoided as much as possible."

These four quotations will suffice to represent the opposing views.

My present opinions, which have not been reached without some thought and much hesitation, but which seem to me more and more satisfactory as my experience widens, are based on the following considerations :

I have never happened to see one of these extremely mild cases in which there was diarrhoea, nor one in which the bowels moved easily after enemata or aperients, run on into the graver type of case. I will doubtless meet with this some time, as others have done so,

but thus far there has been no exception to the rule in my personal experience. I read that of twenty-two cases of peritonitis from appendix troubles occurring at the London Hospital there were nine cases of constipation, with four deaths, and thirteen cases in which the bowels were loose or were easily moved, with two deaths. I find upon analyzing Richardson's tables that of those acute cases which recovered without operation, constipation is mentioned as a prominent early symptom in four, diarrhœa in ten, while in those cases which died without operation there was early constipation in three and diarrhœa in one. The force of these figures is much increased if we remember that where neither diarrhœa nor constipation was mentioned, it is fair to presume that the bowels moved regularly. There was thus eight per cent. of constipation among the cases that recovered, and twenty-eight per cent. among those that died. In addition, every surgeon who has had any abdominal work knows how essential it is to have the intestinal tract thoroughly evacuated before operation. It is in this way and by the prompt administration of salines according to Tait's plan on the first appearance of symptoms of "pseudo-ileus" that general peritonitis is often avoided, not cured, as is incorrectly stated. As any case of appendicitis may become an operative case, it is of the highest importance that in the early stages whatever remains of peristalsis should be encouraged and not destroyed by the use of opium. Furthermore, it has been shown experimentally that after an injection of a culture of the virulent colon bacillus into the peritoneum of animals, if the dose is not too large,

the animal recovers after an illness of which diarrhoea is a symptom (Treves).

For these various reasons my rule in practice is: In all ordinary mild cases give salines until free purgation is assured, and then continue the action more gently by the use of divided doses of calomel, which by its antiseptic properties has a distinct value, and through its effect on the portal circulation aids also in the depletion of the ileo-colic vein and its tributaries.

Spontaneous severe colicky pain, altogether distinct from pressure tenderness, is the only indication I recognize for the use of opium, and I give it then in minute doses combined with enough calomel to overcome its constipating tendency.

I am at present satisfied that this treatment is practically sound, and I am certainly convinced that many patients to whom opium is given early and freely die partly because the imperative need for operation is thereby disguised and the favorable opportunity lost, and partly because the free evacuation of the bowels, so necessary for success, is interfered with.

I may say here, before leaving the subject of the medicinal treatment at this early stage, that in my judgment not enough attention has been paid by either physicians or surgeons to what might be called the antiseptic treatment of appendicitis. It is reasonable to suppose on *a priori* grounds that in a disease the most serious varieties of which are produced by infection with micro-organisms whose habitat is the digestive tract, intestinal antiseptics would be of distinct value. And furthermore, I would say that in all forms of sepsis present or threat-

ened there is good reason for believing that the systematic administration of soluble and powerful antiseptics is of far more importance than is commonly supposed. A record which I will shortly publish of observations in this direction made on cases of carbuncle and of chronic furunculosis will, I think, be convincing of the possibility of powerfully influencing through the blood the susceptibility of the entire organism to bacterial infection and growth. But I merely mention the matter to-night to bring it to the attention of the medical men present, and to ask for their views and experience in this direction.

If the medicinal and dietetic treatment has been successful the symptoms gradually disappear, the local tenderness often being the last to go. Scrupulous continuance of rest, restricted diet, and mild laxatives should be continued for from one to two weeks.

If the symptoms are worse instead of better at the end of forty-eight hours, or earlier than that if there is *severe, sharp* pain, increased tenderness and rigidity of the abdomen, and beginning tympany, either local or general, I think there can be no doubt that surgical interference offers by far the best hopes of recovery. In the majority of cases these phenomena then indicate a perforation of the appendix wall, possibly not macroscopic, but permitting the filtration through it of bacteria and their products.

So far as diagnosis goes there is practically no condition for which such a case can be mistaken. The previous history with the symptoms above described place it beyond all peradventure. Occasionally there may be an ex-

traordinary case in which coexistent disease of another kind would cause doubt or confusion, but I am occupied this evening not with medical or surgical curiosities, but with every-day cases, and these at this stage can scarcely be misunderstood.

We are on equally assured pathological ground. In thirteen such cases examined by Van Cott there were evidences of obstructive conditions found in the vessels of the mesentery of the appendix, either thrombus or endovascularitis, while in the appendix wall there were round-cell infiltration, necrotic areas, and purulent foci. Interstitial neuritis was also présent (Fowler).

It is of course not impossible for resolution to take place in these cases. Not every one of them goes on to gangrene in mass and to infection of the general cavity. Even if resolution does not occur, a protective inflammation may wall off the appendix, and does so in a large proportion of cases.

But there is absolutely no way of recognizing with any reasonable certainty which of these three events will follow: resolution and recovery; localized abscess, with ninety to ninety-five per cent. of chances in the patient's favor; or general peritonitis, with almost sure death if it is once well established.

If operation is done at this stage it is usually easy. An incision two or three inches in length is better than a smaller one, and is most advantageously placed if it is oblique with its centre a little outside of McBurney's point. When the belly is opened there will usually be found a moderate excess of peritoneal fluid, clear or only slightly turbid and without odor, a cir-

cumscribed peritonitis, weak adhesions between the cæcum and the parietal peritoneum and adjacent intestines, and a tense, swollen appendix, either angulated and twisted or erect and prominent, according to the length of its mesentery. It can be removed most safely by making a circular incision through its peritoneal coat, three-fourths of an inch from the base, reflecting it like a cuff, ligating the mucous coat with a circular ligature, touching its surface with a drop or two of pure carbolic acid, replacing the peritoneal coat, and stitching with a Lembert suture. When the peritoneum has become thickened and brittle, almost equally good results can be obtained and more expeditiously by throwing a ligature around the whole appendix one-quarter to one-half inch from the cæcum, removing the organ, and cauterizing the stump with carbolic acid. The appendix will show the microscopic changes I have described. It would be absurd before this audience to waste time with talk of the importance of asepsis or with remarks about the details of technique.

As a rule, the wound may be closed without drainage, and, if closed properly, the risk of ventral hernia is a very small one. The operation will certainly have a small mortality, but for reasons already given it will be a larger one than if it were a simple exploratory operation.

While, however, I believe more patients would be saved by operation at this time than by any temporizing measures, I find that that opinion when expressed at the bedside is not always coincided in by the medical attendant or the patient.

I may say, therefore, that experience has

taught me to await events with more equanimity: 1. If the bowels are loose. 2. If the pain is dull and throbbing (connective-tissue pain, —Bryant), and not sharp and lancinating (serous-tissue pain); the former I refer to a tense appendix, with infiltration of the wall, but without gross perforation or intense or wide-spread peritonitis. 3. If the spot of greatest tenderness on pressure by a finger-tip is not precisely at McBurney's point. This is an empirical rule; but I have noticed in a number of cases in which there was delay at this stage, and which finally did well without operation, that the point of greatest tenderness so anxiously investigated at each visit was more or less remote from the usual region. If this proves to be an observation of any value, it will be for the following reasons: the body and tip of the appendix are less vascular, and less richly supplied with nerves than the base; they are, therefore, more commonly the seat of the earliest degenerative changes. If those changes are very intense, and particularly if they go on to gangrene, sensibility in the body and tip is quickly lost, and pain at the more fixed portion of the appendix, the base, becomes the prominent symptom, and is recognized at the usual point. If the changes are of a milder type, such as permits of recovery by resolution, sensibility of the tip will be retained, and will be felt at various points on the abdominal surface, varying with the position of the appendix. 4. If vomiting is not marked. It is not usually a prominent symptom of this stage of appendicitis in cases which lead to recovery. It will almost always be found present in an inverse relation to the looseness of the bowels. Its absence

is a very favorable circumstance, and always, and I believe justly, influences my prognosis. 5. And, finally, I am less anxious during this period of delay if, without marked change in the general condition, increased resistance, slight dulness, and the presence of a mass recognizable by palpation indicate that a localized abscess is forming, shut off by adhesions from the general peritoneal cavity.

CASE II.—A young man, whom I saw in consultation with Drs. John Musser and William Pepper, had the usual symptoms of a moderate attack of appendicitis for three days. At the end of that time the conditions present were: distinct rigidity of the abdominal muscles over the right iliac fossa; slight tympanitic distention of the same region; temperature, 101.5° F.; pulse, 110; *marked tenderness at a point just above Poupart's ligament at the junction of the middle and inner thirds*. He had been continuously on salines. His stomach was retentive, but there had been no bowel movement for two days. He was getting no food. I was strongly inclined to operate, but delay for twelve hours was decided upon, and at the end of that time there was such marked amelioration of all the symptoms that operation was not further considered.

We may pass in this condition of uncertainty into the period extending from the third to the fifth day with very little alteration of the symptoms, but usually during this time one of the three events already mentioned will occur. If the bowels continue to act spontaneously or with mild laxatives; if the tympany, which

may be quite marked, begins to decrease; if the fever lessens, and especially if tenderness remains well localized and tends to subside, the prognosis is, on the whole, favorable, although the patient is unquestionably in grave danger during every minute of this time. If no amelioration of these symptoms occurs, although no new ones develop, the case at that period, from the third to the sixth day, becomes one of the most anxious and trying with which either physician or surgeon can be confronted. It is the time at which, as Richardson has tersely put it, we may feel that it is "too late for the early operation and too early for a safe late operation." It is probable that adhesions have formed, offering a certain degree of protection against general infection, but experience shows that in many cases they cannot be depended upon, and we may find at any visit that the tenderness and tympany have increased in intensity and become more widely diffused, that vomiting is more frequent and uncontrollable, that the fever has risen to 104° or 105° F., or, more ominous still, has disappeared, leaving the temperature subnormal; in other words, that the general peritoneum has become involved. If, with the fear of this occurrence before us, we proceed in such a case on the fourth or fifth day to removal of the appendix, we do so with the knowledge that there is much risk of breaking up the recent and delicate adhesions which have thus far been the patient's safeguard, and we know that it is not always possible under these circumstances, however thorough and minute our precautions, to prevent a spread of the infection. Here, again, I am not in sympathy with those

surgeons who speak in an airy and confident way of the overwhelming advantages of operation, but am once more of the opinion of Richardson, whose excellent work and writings on appendix disease entitle him to frequent quotation, and who says that "there is no more difficult operation in surgery than that of removing an appendix at this stage without infecting the general peritoneal cavity." The question certainly is one of the most important connected with this discussion.

I have tried earnestly to find some light upon it, but my own experience and the recorded testimony of the profession have alike failed to help me. With absolutely identical symptoms on which to base a prognosis at this stage, any two cases may go on, one to recovery, the other to death, and the same remark applies to the results of operation. On the whole, however, this very uncertainty tends to favor operation, in spite of its undoubted dangers.

We are now dealing with a case of circumscribed peritonitis threatening to become general. The infection which is giving rise to it is a progressive one. Ziegler and others have shown that the effect of injecting a culture of the colon bacillus into the peritoneum of animals varies, other things being equal, with the dose. In the mildest cases an illness in which, as has already been stated, diarrhoea is a symptom is followed by recovery. In another grade a localized purulent peritonitis is produced, running a slow course. If the dose is larger a fatal diffuse fibro-purulent peritonitis follows, and if still larger death may occur from acute sepsis before there has been time for any of the phenomena of peritonitis to develop.

The peritoneum has thus undoubted ability to take care of certain quantities of bacterial poison, but succumbs to larger ones, and for this and other reasons it cannot be questioned that if choice had to lie between infection during and because of an operation on the third or fourth or fifth day, and, on the other hand, an operation to which we are forced on account of spontaneous infection at some later period, the former is by far to be preferred. Many recoveries do occur after operation at the beginning of a general peritonitis, but the difficulties and dangers of the case are both so greatly increased at that time that if its probable occurrence could be predicted with any certainty, operation in anticipation of it would with equal certainty be indicated.

Statistics as yet help us but little, because we do not know even approximately what proportion of patients in whom the policy of delay is adopted survive or perish.

The reported operative cases are of little use, as many of the operations were undertaken in the presence of septic peritonitis. Fowler, for example, in forty-nine operations, on the fourth, fifth, sixth, and seventh days, lost twenty-one of his patients; but eighteen of them had this condition pre-existing, and the length of time it had existed is not stated. On the other hand, I find from Richardson's figures that twenty-eight operations followed by death were done at a time averaging five and a half days after the first symptoms, while in fifty-eight operations followed by recovery the average pre-operative time was nine and one-half days.

This, however, may indicate merely what

might be called the survival of the fittest, and can certainly not be used as an argument in favor of delay.

It is obvious that until we have figures, especially from our medical colleagues, which will enable us to contrast the results of expectancy with, first, the mortality of operations in the presence of distinct, but presumably localized, peritonitis and before general infection, and, next, the mortality at the beginning of general infection, we cannot settle the matter statistically.

The diagnosis between appendicitis and other distinct diseases during this period presents but few difficulties. Many of the long lists of differential diagnoses already published are useless to the practitioner of ordinary intelligence, and serve only to add to the flood of pointless compilations with which we are overwhelmed.

It is the diagnosis between the existing conditions in and about the appendix in any given case, and their probable outcome, which is of the most vital interest, and on which no amount of time would be wasted if it advanced us ever so little in our bedside knowledge of these cases at this important stage. Much weight has been attached to the presence or absence of pus, and to the great desirability of finding some reliable test for its presence. Thus far all such tests are purely theoretical, and none that have had a fair trial have given satisfactory results. It is certain that at present no safe prediction as to this point can be based on the condition of the blood or the condition of the urine. The leucocytosis described by Richardson as being present in perforation has

no apparent relation to suppuration, but it requires and deserves further investigation.

But, after all, while information as to the presence or absence of pus is much to be desired, what we need far more, and what would be of far greater use to us, is information as to what symptoms indicate a persistent circumscription of the inflammatory action, whether it be suppurative or otherwise, and what symptoms point to an extension to the general peritoneum. In the presence of the latter we would operate altogether irrespective of the existence or non-existence of suppuration. Treves has shown that in the larger proportion of cases of fatal peritonitis the leading symptoms are those of poisoning, and not of inflammation. Extension of the latter to the general peritoneum means that a large part of the enormous area of that membrane (probably as great as that represented by the whole cutaneous surface) takes part in the absorption of the products of the bacterial infection.

It should not be forgotten that the cases in which suppuration is most pronounced are among the most favorable examples of peritonitis, and that the most hopeless cases are often among those that show the least inflammatory changes. For example, seventy out of one hundred cases of peritonitis at the London Hospital died. In thirteen of these the cause of the peritonitis was either cancer or tubercle or was never found. That leaves fifty-seven examples of death from peritonitis. Now, in only fifteen of these was the exudation purulent; in eleven it was described as sero-purulent; and in the remaining thirty-one cases there was not even a suggestion of pus (Treves).

It is evident that we need far more than a test for pus to aid us in these cases, and that the talk which is so common about operating as soon as there is a recognizable sign of pus, while it is correct so far as it goes, is superficial, and fails to take into account problems which are both more serious and more recondite.

I shall recur to this subject for a moment later ; but as to this aspect of it, must admit that at present we have no safe rule to guide us as to the greater or lesser likelihood of generalization in any particular case of appendicitis in the stage of circumscribed peritonitis. As we know clinically that localized varieties of peritonitis and circumscribed exudations are very rare in the area occupied by the small intestine, and as we know both clinically and experimentally that the peritonitis which involves its covering is of the most violent and intense variety, it might perhaps be safe to say that where the area of tenderness is small and distinctly confined to the cæcal and pericæcal area the prognosis is more favorable than when it extends beyond that region, and the latter occurrence might thus be regarded as pointing in the direction of generalization, and, therefore, of operation ; but I have no reliable observations to confirm this view, which may be unsound as a practical guide. Of the phenomena which mark the actual onset of diffused peritonitis, perhaps the gradual increase of tympany and tenderness and persistent vomiting are the most significant.

If operation *is* done in a doubtful case at this time, it will differ from the procedure already described in the necessity for thorough cleansing of the peritoneal cavity, if it is found to be in-

fect, and in the employment of drainage. It differs also in the great care which must be taken, if a localized cavity containing purulent or sero-purulent fluid is found, to avoid making a communication with the general cavity of the belly. Large numbers of cases show now beyond all doubt that it is infinitely better to leave the appendix than to make a prolonged search for it, or to employ much manipulation in freeing it from adhesions preparatory to removing it. The later the time of operation and the stronger and firmer the abscess wall the safer the operative procedure becomes; but in every case and at every period, if there is a circumscribed abscess, it is poor surgery to insist upon finding and taking away the appendix in the face of obstacles.

CASE III.—I saw some years ago, in consultation with Dr. Newberry, of Fort Washington, a young man with all the phenomena of appendicular abscess. An opening over the most prominent part of the fluctuating swelling gave exit to a pint or more of fetid pus. The appendix was gangrenous quite down to the base. *but was partly embedded in the inner wall of the abscess cavity. I freed it with some difficulty* and as gently as possible, ligatured it on a level with the cæcum, and strengthened the intensely inflamed area at that point with an omental flap. I drained with a glass tube. The operation was done rapidly, there was no shock, and the patient had not a bad symptom for twenty-four hours. Then he developed general septic peritonitis and died within a day or two.

This case operated on 'very early in the period of appendix surgery will always be a

source of regret to me. I did what was then considered the ideal operation in the face of great difficulties, but lost the patient. From that day to this I have never lost a case in which there was at the time I operated a well-localized abscess. I have often removed the appendix when it was easily found, but I have oftener left it without more of a search for it than could be made in two or three minutes.

CASE IV.—Later, I saw, in consultation with Professor William Osler, of Johns Hopkins, and Dr. Kerr, of Washington, a lady who was suffering with an attack of appendicitis of a chronic type. She had been ill for more than two weeks. There was a thick-walled tumor in the right iliac fossa. An incision through thickened and œdematous tissues gave vent to a large quantity of fetid pus. Digital exploration with the finger showed dense adhesions in every direction. *No further search for the appendix was made.* A drainage-tube and iodoform gauze were inserted and the angles of the wound closed. Recovery was uninterrupted. A sinus which persisted for a time finally healed.

CASE V.—I operated, in consultation with Drs. Mackenzie and Sheppard, of Trenton, on Mr. P., a brewer, exceedingly stout and in an apparently profoundly septic condition. The abscess cavity which I opened was so immense that it seemed almost certain that it was practically the general cavity of the peritoneum. No free coils of intestine could be felt, however, even with the whole hand introduced and swept cautiously around the walls of the cavity, which reached over beyond the middle line.

A loose fæcal concretion was found. No search was made for the appendix. Irrigation, iodoform, glass drainage, and iodoform packing were used. An unfavorable prognosis was given, but the patient made a rapid and uneventful recovery.

I could record many such cases, but there is not enough variety about them to make their details of interest. They have recovered without exception.

The soundness of this procedure is abundantly certified to. In a series of cases of perforative peritonitis reported by Kaiser, of six examples in which the exact point of perforation was never found, five recovered. Treves says, "The wisdom of doing no more than is necessary, or as little as is obvious, is well illustrated in these cases. A clump of adherent intestines will often cover and protect a perforation, and the ubiquitous lymph will many times close such an opening with more speed and security than are provided by any system of suturing. As the surgeon, therefore, reaches what appears to be the starting-point of the peritonitis, he must proceed with the utmost caution, and be not only prepared, but rather inclined to leave the actual *fons et origo mali* undemonstrated. The main purpose of the operation is to allow a noxious exudation to escape and, if possible, to free the peritoneum of the cause of its trouble. In the class of cases now under discussion, a perforation will be very often the starting-point of the peritonitis; the lapse of time and the plastic character of the inflammation afford evidence that the perforation is for the time being closed. If the

operator can rid the serous cavity of the effects of the perforation, he may very often leave the breach itself to be dealt with by natural means." In seventeen cases in which Fowler did not remove the appendix, and which recovered, there was recurrence in only two within the next two years. The remainder had gone for variable periods, three of them for between three and four years, without any symptoms. I have now had fifteen such cases myself, and in none of them have I heard of any subsequent trouble other than the occasional occurrence of a small fecal fistula, which sometimes relapsed once or twice, but has thus far finally closed spontaneously and permanently in every instance.

Usually at the operation the cæcum is the first structure recognizable after the abdominal wall is incised, and the anterior muscular band leading to the base of the appendix is occasionally a useful guide; but generally the increased resistance felt by the finger at a particular point, followed by inspection with the wound gently held open by retractors, will reveal the whereabouts of the organ. If it is found in this way and can easily be isolated by the finger and a thread thrown around its base, its removal is clearly indicated. If, however, as in a case operated on a few days ago, it is deeply embedded in the abscess wall and its tip only is visible, it is far better to leave it undisturbed.

CASE VI.—The patient was referred to me at the German Hospital by Professor James C. Wilson. She was a woman of fifty years of age, but had not had her menopause. She was of low intelligence, and no satisfactory history could be obtained. It was certain, however,

that after her admission to the hospital she complained bitterly of pain in the left iliac region, and only later of pain and tenderness on the right side. Vaginal examination revealed a firm, resistant, tender mass on the left side and nothing abnormal on the right side. Her temperature was 101° to 103° F.; her pulse 110. There was dulness over the right flank. There was general tympany; some general tenderness, more marked, however, on the right side and at McBurney's point. Borborygmi could be heard by abdominal auscultation. The bowels moved freely under salines, after which there was a drop of two degrees in temperature and some improvement as to her feelings, but the local phenomena remained unchanged. An incision gave exit to perhaps twenty-four ounces of horribly fetid pus, which had been under great pressure. Inspection showed the distal extremity of the appendix projecting into the cavity *from among a mass of intestinal coils covered with lymph and firmly matted together. No effort was made to remove it.* The patient has done well.

The same reasons that forbid interference under these circumstances have prevented me from looking long or earnestly for other foci of suppuration. Sometimes they may easily be recognized and opened into the larger abscess cavity by the finger; but when this is not the case, I think the patient's chances are better if the possibility of their presence is disregarded, as they are found in only a minority of cases, and as then they not infrequently open spontaneously into the original cavity.

Irrigation, drying the cavity, dusting it with

iodoform, the insertion of a large, thick-walled, rubber drainage-tube, and light packing with iodoform gauze complete the operation, as I am in the habit of performing it.

The prognosis during all this period is in direct relation to the localization of the symptoms and to the absence of general sepsis. Nothing else is of much importance. Accordingly, a well-marked tumor, a moderate fever, a high-tension pulse not of excessive frequency, a limitation of the tenderness to the right iliac region, even if there it be exquisite, any evidence of continued peristalsis, such as the recognition of borborygmi by abdominal auscultation, are all favorable.

But at this or at any stage of this disease, from the earliest onset to the period of complete recovery, we may meet with quite a different set of symptoms. In the beginning the torsion of the appendix may be nearly or quite complete; or with moderate torsion there may be an exceptionally imperfect blood-supply; or in either case the bacteria present may be of especial virulence or in unusual quantity; or, finally, the resistant power of the individual may be markedly defective. According to the varying predominance of one or the other of these factors, we meet clinically with types of cases directly comparable with those conditions produced in animals by experimental inoculation with the colon bacillus. Two of these we have now very imperfectly considered,—the mild cases in which the peritonitis is an inconsiderable element and which usually end in recovery, and the cases of distinct circumscribed peritonitis running a more chronic course and ending either in resolution or, if

more severe, in localized suppuration. Either with or without these precedent stages we may have a general septic peritonitis. If this results from spread by continuity,—the usual mode in which a localized peritonitis becomes general,—or by infection through the lymphatics of the appendix and meso-appendix, or by a slow leakage of inflammatory products through the appendix wall, or by the migration of bacteria along the same channels, its approach may be slow ; if it follow the rupture of an abscess it will be much more rapid.

CASE VII.—In a case recently seen, in consultation with Dr. Joseph Martin and Dr. Thomas Yarrow, the patient had been in excellent general condition up to noon of the fourth day of his illness ; temperature, 101° F. to 102° F. ; pulse, 90 to 105 ; moderate vomiting, obstinate constipation. When Dr. Yarrow first saw him, *six hours later, the temperature had dropped to normal, the pulse was 120 and thready.* There was great restlessness ; constant rejection of small mouthfuls of fluid ; a distended board-like belly. When I saw him, within a few hours, the pulse was 140 and running ; the temperature normal ; consciousness perfect ; restlessness incessant. No operation was advised. He died in a short time.

CASE VIII.—I saw, in consultation with Drs. Johnson, of Lawrenceville, and Elmer, of Trenton, Mr. B., a teacher in the Lawrenceville School, New Jersey. He had been apparently convalescing from an attack of appendicitis when, contrary to orders, he walked from one room to another. *He was at once seized with a*

violent abdominal pain, which was immediately followed by distention, vomiting, and symptoms of shock. I operated a few hours later, irrigating and draining the purulent cavity, which contained a large quantity of pus, but he died the next day.

CASE IX.—An almost precisely similar case, seen at Princeton by Dr. Agnew and me, in consultation with Dr. Bergen, had a similar course and termination. In this case also operation was tried as a last resort.

But in either event it is usually of the fibropurulent variety, and is accompanied by much exudation. The patient soon presents the typical picture of diffused peritonitis: incessant restlessness, greatly-distended belly, tender everywhere to the lightest touch, dorsal decubitus, constant vomiting of small mouthfuls without much effort, thoracic respiration, obstinate constipation, absence of intestinal sounds, high fever, followed towards the end by subnormal temperature, cold sweats, and collapse.

It is of great interest, however, to note that even the cases which tend to run this course will occasionally recover when seen and operated on at the very onset of the generalized symptoms. In fact, if operation *precede* the development of septic paralysis of the intestines, a very fair percentage of such cases will recover; but after the latter phenomenon has appeared I regard the case as absolutely hopeless. If it is unmistakably present, it is, I think, best to decline to operate, as we will have less difficulty in obtaining consent to operative interference where we can do more good, if

there are fewer deaths, which, however unjustly, seem to the laity to be, so far as operation is concerned, in the relation of effect to cause.

But if there is any doubt about it, it is well to open, irrigate, and drain the abdomen. I have already called attention to the fact that the suppurative cases are among the most favorable examples of peritonitis, whether general or localized. When localized they are *very* favorable, and even in these general septic cases the more the suppurative process overshadows the toxæmia the better the patient's chances. It may be well to note a possible explanation of this fact. Reichel some years ago determined that by gradually administering increasing doses of pure cultures of pyogenic micrococci to the peritoneum of an animal an immunity against an extremely large dose of this poison could be produced.

The same immunity was acquired in the same way against the introduction of a sterile filtrate from the cultures and against the metabolic products of the staphylococci. Control experiments were uniformly fatal in animals not previously prepared.

Attention has been called by Binnie to the clinical differences between the rupture of a chronic pyosalpinx, even if of enormous size, and a case of very acute or so-called fulminating appendicitis with gangrene of even a small portion and escape of the contents.

CASE X.—I saw some time ago, in consultation with Dr. William Pepper, a child in whom, within a very few hours of the onset of the symptoms, there *was gangrene, not only of the appendix itself, but also, and apparently as a result of an*

overwhelming bacterial infection, of an adjacent portion of the ileum. Distention was enormous. An enterostomy was done with a little temporary relief, but the child died soon afterwards.

The chances of the patient, if operated on in a reasonable time, are far better in the former than in the latter case. Operation within three hours of the very first symptoms of such an event has failed to save the patient. He dies, as Treves has emphasized, not of the inflammation, or still less on account of any suppurative process, but from a profound toxæmia. In the pyosalpinx there has been an opportunity for slow auto-inoculation; in the rapid gangrene of appendicitis there has been no time for this process. It is in such cases that we often find the flat, silent belly indicative of absolute paralysis of the *whole* intestinal tract, no peristalsis remaining in any portion to force gas into any other portion; and we have all the symptoms of shock and collapse. Here also operation is useless and to be avoided.

But in the suppurative cases, for both the practical and theoretical reasons above given, if any sign of peristalsis remain—and this is the very best indication I know of as to interference or non-interference in these excessively grave cases—it is better to open and irrigate, even if the patient is liable to die on the table. Occasionally a desperate and apparently hopeless case will be saved.

Possibly the protective effects of auto-inoculation may help to explain the comparatively favorable results obtained in some of the later operations, though it would be pushing the idea beyond reason to base upon it any de-

fence of delay. Yet I am sure that every surgeon present must have occasionally felt surprised when, in operating on these slow or so-called chronic cases of appendicitis, he has contrasted the relative mildness of the symptoms with the enormous quantities of fetid pus under high pressure which he sometimes evacuates.

CASE XI.—I saw recently, in consultation, a case in which *there were practically no general symptoms* beyond a temperature of 100° F., a furred tongue, and some malaise. The patient had been out of bed within a day or two. The physician in attendance declined to believe in the presence of pus, which seemed to me indicated by the local symptoms. He assented, however, to an operation, which showed the presence of *twelve ounces of markedly fetid pus*, the first gush of which came with such force that it was projected a foot or more from the patient.

The best immediate indication of gross perforation of the appendix, with escape of its contents into the general cavity, is sudden violent excessively acute pain, followed by rapid change of temperature, either rise or fall, and marked increase of pulse-rate with diminution of volume and force. If the sepsis be profound the belly may be flat; if a little less in degree it may be barrel-shaped. Vomiting is usually a conspicuous symptom of this, as it is of other forms of perforative peritonitis, except that resulting from perforation of the stomach. It often shows its usual inverse relation to normal peristalsis. In eight cases of perforative peri-

tonitis in which the bowels moved freely up to the time of the accident, constipation immediately followed in five. In these the vomiting was much more marked and persistent than in the remaining three where the bowels continued loose (Treves).

Of course in these cases operation must be immediate, and even then the mortality has been, and doubtless will be for many years, enormous.

Recurrent and Chronic Relapsing Appendicitis.—There remains to consider briefly the subject of recurrent and of chronic relapsing appendicitis. Here again the most diverse views exist, and we are brought back to our original starting-point as a basis for discussion. If, as I believe, various mechanical factors enter into the production of acute attacks, and if quite commonly those factors are brought into play by digestive derangement, and if an acute attack does not of necessity leave a permanent lesion of an infectious type, it is obvious that a patient may have two or even more mild attacks and safely decline operation. If, however, after any and every inflammation of the appendix, the patient is left, as has been asserted, with what is practically a charge of dynamite in the abdomen, operation should be much more frequent than it has yet become.

We shall do well, both in discussion and in practice, to separate the recurrent from the chronic relapsing cases. The former are well illustrated by the following case.

CASE XII.—In December, 1889, a gentleman aged thirty-eight had a mild attack of catarrhal appendicitis. He was ill for two or three

days; was out of bed in four days. He was treated by rest, starvation, salines, and calomel. *His attack followed immediately upon a too hearty meal of broiled lobster after a day's shooting.* In 1890 he was in New York and on a visit, and had another attack. I was telegraphed for and went over to see him, meeting in consultation a well-known surgeon who had been called in at once. We agreed as to the undesirability of an operation at that time, but later disagreed, the New York surgeon advising removal of the appendix as soon as convalescence was established and I dissenting. I based my advice on the fact that the second attack, like the first, was clearly due to over-eating when tired, and especially on the circumstance that *it again followed a meal of broiled lobster.* Moreover, neither attack had been of a dangerous type. The opposing views were submitted by the patient, at my suggestion, to Dr. Agnew, who decided in favor of delay, and subsequently to Mr. Treves in London, who coincided in that opinion. The patient has never had another attack.

I have seen many such cases, and I am sure that this will be the testimony of the medical men who are most capable of informing us on this branch of the subject. At present I feel quite clear that the outcry for operation after one or two *such* attacks is based on conceptions of the etiology and pathology of the disease which are so incorrect that they entirely vitiate the arguments founded upon them.

In chronic relapsing appendicitis the case is somewhat different. The interval then is not one of entire health; there are digestive disor-

ders, flatulence, constipation or diarrhœa, and pain in the right iliac fossa, aggravated by motion, or exercise, or fatigue. The attacks themselves are of a higher grade of severity, are accompanied by the appearance of a tumor, which often never entirely disappears, and by distinct evidence of localized peritonitis. The general health suffers severely, and the patient is apt to be anæmic and emaciated. I have observed this especially in females.

CASE XIII.—In a case sent me from Bellefonte, Pa., by Dr. Seibert, the child, a little girl aged ten years, was reduced to a condition of such *chronic invalidism and exhaustion* that even during an interval it was a question whether she could survive the journey to Philadelphia; and yet the operation was of the easiest type, completed in ten minutes without trouble. The appendix was thickened and twisted and diseased, but had no important adhesions. *The improvement in health was immediate* and has been continuous.

In the majority of these cases which finally require operation, especially in those in which the persistence of the local symptoms during the interval is marked, pus is present in small quantity and surrounded by thick, firm adhesions.

CASE XIV.—On the other hand, as in the acute cases, very great local disease may be attended with almost no constitutional phenomena. In a patient of Dr. Fussell's I found a *degree of inflammatory thickening and of fusing together of cæcum, appendix, omentum, small in-*

testine, and parietal peritoneum that nearly made the operation impossible and excited in my mind grave fears for the ultimate result, and yet the boy had been walking and playing and complaining of local pain only occasionally, and he made a rapid and uninterrupted recovery.

CASE XV.—In a patient of Dr. Russell Johnson's, on whom Dr. Agnew and I operated, there had been so *large a number of attacks, brought on by exertion*, that the young man was almost afraid to stir out of the house, and yet he was a *picture of health and was not in the least affected in spirits or otherwise*. The local pain was simply so severe that while it lasted it was crippling. The appendix was adherent to the brim of the pelvis.

CASE XVI.—A *healthy, robust* woman, sent to me by Dr. Snyder, of White Haven, had had between *one hundred and two hundred attacks*. The appendix was angulated and buried in a mass of omental adhesions.

The diagnosis may usually be made by the history, the localized pain, the variable tumor, etc. Not infrequently, especially where the early stage of a malignant neoplasm is suspected, the only possible diagnosis is by exploratory incision.

Even these cases do not invariably require operation. In some instances I have suggested it, and then have acquiesced in the patient's request for a period of delay, which has now in several cases extended over some years and seems likely to be permanent. Treves, who originally proposed the operation in 1877, has

thought it necessary within a year to call attention to the fact that it has been performed recently without proper discrimination, and adds, "The circumstances which would justify an operation in these cases must be precisely defined, and it cannot be too emphatically stated that, in a fair proportion of instances in which the trouble has relapsed, no surgical interference is called for. "I am aware of many cases in which a patient has had three or more attacks of typhlitis, and has then ceased to be troubled with any further outbreaks. In some examples of the relapsing form much can be done by medical means, by diet, by attention to the bowels, and by placing the patient under conditions more favorable to a state of peace within the abdomen."

Here again, also, we have the old fable about the mortality of the operation being "practically *nil*," but Bull's statistics, just published, show a mortality of nearly two per cent., and he remarks that if he could add four fatal cases that he is aware of, it would be raised to more than two per cent., and, further, that five or six per cent. would be a fairer estimate if we struck an average of the work of individual surgeons. There is, however, good reason for believing that the mortality for the operation in skilful hands will be a low one. The experiments of Reichel, already alluded to, demonstrate beyond a doubt the possibility of a certain immunity resulting from auto-inoculation with pyogenic material. There seems to be good reason for believing that this comparative invulnerability thus acquired renders the peritoneum more indifferent to traumatism than in its normal condition. (See Case XIV.)

It is a clinical fact that an intraperitoneal operation on a subject who has had several attacks of subacute or chronic peritonitis is, *cæteris paribus*, a less serious affair than if the same operation is done on a patient whose peritoneum has hitherto been uninvaded by disease or for operative purposes. Treves says as to this point, "In the operation for the removal of the vermiform appendix in cases of relapsing typhlitis, the little disturbance which follows extensive procedures occupying as long as one hour and a half can, I think, be explained only by an immunity acquired by the peritoneum after repeated attacks of inflammation. Moreover, in advanced cases the disproportion which is often noted between the constitutional disturbance and the local condition discovered at the operation appears to be capable only of the same explanation."

CASE XVII.—In another relapsing case just operated on for Dr. Fussell the appendix was buried in dense adhesions posterior to the cæcum, and was firmly adherent by its tip to the iliac vein. The union was so intimate that I tied off both tip and base and removed the intermediate portion, which showed a small perforation. There was present a general plastic peritonitis. The patient, who had only recently recovered from a severe attack, *was extremely emaciated and had the typical facies abdominalis*, and yet *six hours after the operation*, which took three-quarters of an hour, *his temperature was normal, his pulse 102, he had a movement of the bowels, and expressed himself as feeling better.* He is now making an excellent recovery.

If the indications for operation are clear, I think the question as to whether it shall be done between or during attacks must be unhesitatingly decided in favor of the period of quiescence, the operative difficulties being then much less, especially as regards the important question of possible general infection. In the recurrent type, if operation is to be considered at all, it would be well to take the inappreciable risk of waiting for another attack, which may never come.

In the chronic relapsing cases, however, if the surgeon, in deciding upon operation, limits himself to the following indications formulated by Treves, which fairly express those of many surgeons in this country, myself included, he had far better take advantage of the interval. Operation is indicated when: 1. The attacks have been very numerous. 2. The attacks are increasing in frequency and severity. 3. The last attack has been so severe as to place the patient's life in considerable danger. 4. The constant relapses have reduced the patient to the condition of a chronic invalid and have rendered him unfit to follow any occupation. 5. Owing to the persistence of certain local symptoms during the quiescent period there is a probability that a collection of pus exists in or about the appendix.

The operation itself may be one of the easiest in abdominal surgery, or so difficult as to be impossible in its entirety, if due regard is had to the survival of the patient. (See Case XIV.)

There are no very radical differences of opinion as to its technique, so the details need not be mentioned. Such differences as do exist relate chiefly to the symptoms and condi-

tions which demand or which justify the operation. Bull has well expressed the situation in this respect: "We need more carefully recorded cases not only of the patients who come to operation, but of those who have successive attacks relieved by medical measures. There are many gaps to be filled between the position of the surgeon who operates only when there are definite symptoms of chronic disease which have been found by operation to correspond with definite lesions of the appendix, and those who resort to operation after one or two attacks in individuals who have no symptoms, because they believe future attacks must occur in the order of nature and must endanger life. The position of the former may be too conservative, but I think it is 'up to date' with the knowledge we have at present. The attitude of the latter is unscientific, as their statements are not borne out by demonstration."

It is just to say, in conclusion, that, while I see no reason for joining in the outcry about the claims of appendicitis to be considered a purely surgical disease, the sum total of the relations of surgery to appendix troubles reflects the greatest credit upon that branch of the profession both in this country and abroad. The beneficent work done by surgeons has now fully established their right to be early participants in the management of cases to the later and more unfavorable stages of which they are so frequently called. Altogether apart from the extravagant claims of extremists, it is certain that the field of operative surgery in this disease is a steadily widening one, and that as time goes on and the joint labors of progressive yet duly conservative men in both medicine

and surgery begin to bear their fruit, we shall save, by increasing precision and exactness in diagnosis and treatment, many lives now unavoidably sacrificed.

The views above expressed may be summarized as follows:

1. The explanation of the great frequency of inflammation of the appendix is to be found in the following facts:

(a) It is a functionless structure of low vitality, removed from the direct faecal current; it has a scanty mesentery so attached to both caecum and ileum that it is easily stretched or twisted when they become distended; it derives its blood-supply through a single vessel, the calibre of which is seriously interfered with or altogether occluded by anything which produces dragging upon the mesentery.

(b) In addition, there is almost always present a micro-organism—the *bacterium coli commune*—capable of great virulence when there is constriction of the appendix or lesions of its mucous coat or of its parietes.

2. The symptoms in a case of mild catarrhal appendicitis—general abdominal pain, umbilical pain, localized pain and tenderness on pressure in the right iliac fossa, vomiting, moderate fever, and slightly-increased pulse-rate—cannot at present with any certainty be distinguished from the symptoms, apparently precisely identical, which mark the onset of a case destined to be of the very gravest type.

3. It must be determined by future experience whether or not operation in every case of appendicitis, as soon as the diagnosis is made, would be attended by a lower mortality than would waiting for more definite symptoms in-

dicating unmistakably the need of operative interference. At present such indication exists in every case if the onset is sudden and the symptoms markedly severe, and whenever in a mild case the symptoms are unrelieved at the end of forty-eight hours, or, *a fortiori*, if at that time they are growing worse.

4. It must be determined by future experience whether cases seen from the third to the sixth day, which present indications of the beginning circumscription of the disease by adhesions and which tend to the formation of localized abscesses, will do better with immediate operation with the risk of infecting the general peritoneal cavity, or with later operation when the circumscribing wall is stronger and less likely to be broken through. At present, operation is certainly indicated whenever a firm, slowly-forming, well-defined mass in the right iliac fossa is to be felt; or, on the other hand, when a sudden increase in the sharpness and the diffusion of the pain and tenderness points to perforation of the appendix or breaking down of the limiting adhesions.

5. In the beginning of general suppurative peritonitis, operation offers some hope of success. In the presence of general peritonitis with septic paresis of the intestines, operation has thus far been useless.

6. Recurrent appendicitis of mild type, like acute appendicitis, frequently results from digestive derangements. Several attacks may occur followed by entire and permanent recovery, but it is as yet impossible to differentiate these cases accurately from those which do not tend to spontaneous cure. Operation is certainly indicated whenever the attacks are very frequent.

7. Chronic relapsing appendicitis is characterized by the persistence of local symptoms during the intervals and by more or less failure of the general health. It usually indicates operation.

8. In either the recurrent or the chronic relapsing variety operation should be advised according to the following indications formulated by Treves: whenever (1) the attacks have been very numerous. (2) The attacks are increasing in frequency and severity. (3) The last attack has been so severe as to place the patient's life in considerable danger. (4) The constant relapses have reduced the patient to the condition of a chronic invalid, and have rendered him unfit to follow any occupation. (5) Owing to the persistence of certain local symptoms during the quiescent period, there is a probability that a collection of pus exists in or about the appendix.

JANUARY 10, 1893.

WHOLE SERIES, VOL. XVII.

No. 1.

THIRD SERIES, VOL. IX.

— THE —
Therapeutic Gazette

A MONTHLY JOURNAL

— OF —

General, Special, and Physiological Therapeutics.

GENERAL THERAPEUTICS,

H. A. HARE, M.D.,

Professor of Therapeutics in the Jefferson Medical College.

OPHTHALMIC AND AURAL THERAPEUTICS,

O. E. DE SCHWEINITZ, M.D.,

Chief of Professor of Ophthalmology to the
Jefferson Medical College.

SURGICAL AND GENITO-URINARY THERAPEUTICS,

EDWARD MARTIN, M.D.,

Chief of Professor of Genito-Urinary Diseases, University of
Pennsylvania.

EDITORIAL OFFICE, 222 South Fifteenth St., Philadelphia, U.S.A.



⚡ Subscriptions and communications relating to the business management should be addressed to the Publisher.

GEORGE S. DAVIS, DETROIT, MICH., U.S.A.,

OR

716 Filbert Street, Philadelphia, Pa.

Published on the Fifteenth Day of Every Month.

SUBSCRIPTION PRICE, TWO DOLLARS A YEAR.

Agent for Great Britain: Mr. H. K. LEWIS, Medical Publisher and Bookseller, 15, Crown Street, London, W. C.

Entered as the Post-Office at Philadelphia, Pa., as second class mail matter.

COPYRIGHT, 1893, BY GEORGE S. DAVIS.

PRINTED BY J. S. KIFFERLEY COMPANY, PHILADELPHIA.